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SPECIAL ARTICLES

HIERONYMI FRACASTORII SYPHILIDIS SIVE MORBI GALLICI
THE HONOURABLE WILLIAM RENWICK RIDDELL, LL.D., D.C.L.

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THE SANITARY INSPECTION OF RURAL SCHOOLS
DR. J. A. MORGAN

RADIO TALK—Past and Future
DR. GORDON BATES

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Hieronymi Fracastorii Syphilidis Sive Morbi Gallici

By The Honourable William Renwick Riddell, LL.D., D.C.L., etc.,
President, Canadian Social Hygiene Council.

Book II.

NOW, come, I shall hasten to show what manner of life should be led, what remedy it is proper should be exhibited against so great a plague and at what times (this is the second part of my undertaking): and I shall point out the admirable discoveries of men.

Of course, astounded by this new thing, they tried many remedies in vain, yet greater industry in matters of difficulty and experience increasing by long use became conqueror: it was granted to man to project remedies afar and to subdue the plague with sure chains and raise himself victor unto the clear skies.

I believe, indeed, certain of our discoveries were due to divine guidance, the Fates themselves leading the ignorant—for, however fierce the tempest, however malign were the stars, yet the presence of the gods never wholly left us or the clemency of gentle Heaven. If we saw an unaccustomed disease, harsh and unhappy wars and the household gods sprinkled with blood of their lords, fortresses and cities burned and kingdoms overturned and temples and altars profaned and sacred things taken away—if rivers breaking through their banks cast down the harvests, and woods uprooted and herds and their masters and the very land torn up swam in the middle of the waves—and hostile penury beset the country, yet this, this same age can plow with its keels all that immense sea which Amphitrite[1] embraces—(this, the Fates denied to them of old). Nor does it, now, seem enough to penetrate to the hidden seats of the Hesperides far removed from furthest Atlas[2] and to view Prassum under the Antarctic[3] and the cliff-shores of Rhaptus[4] and to bring merchandise from the Arabian and from the Carmanian Sea[5], but we must go even to the people of Aurora, daughter of Titan, beyond the Indus, beyond the Ganges, where formerly was the end of the known world for navigation. Cyambe passed over, the forests are rich in

ebony, happy in macer[6]. Finally with daring oar, the gods guiding, we reach a land differing from our clime in its people and bright with greater stars.

We see, too, that prophet sublime[7] whom in his song, applaud beauteous Parthenope and placid Sebethus from his hollow cavern and the shades and manes of Vergil, who sang the mighty orbs of the stars and the Gardens of the Hesperides and all the regions of the varying sky.

Of thee I may not speak, Bembo, and of others whom future fame and the coming ages after you are cold in death will wish to compare with those of old—but among all the gifts of the gods to us, the great souled Leo[8] is never to be passed over in silence, by whom Latium, mighty exalted Rome, raises high the head, and from his river-bed, Father Tiber rises and by his murmuring wave felicitates Rome in ovation. Under his auspices, the malign stars have ceased toward the world and now reigns Jupiter with joyous orb, and heaven placated diffuses pure rays. He is the one who after so many calamities and long tribulations has called back the exiled Muses to sweet delights and has restored to Latium her ancient laws and right and religion—who now is in his mind planning a just war for Rome, for the religion of the gods. Wherefore, even the Euphrates, even the wide mouths of the Nile and the wave of the Euxine flowing back, tremble and the Ægean Doris flees within her Isthmuses.[9]

While others sing such events and while they celebrate his glorious deeds, while thou perchance mayst prepare to celebrate and to commit to deathless pages the future conqueror—we whom the Fates call not to such duties, will pursue the trifles[10] already begun as far as our slender Muse shall lead.

In the first place, inasmuch as there is not only the one species of blood affected, you will have the greater hope in that disease which has its seat in pure blood. In fact in those whose veins swell with black bile[11] and pulsate with thick blood, in those the difficulty is greater and the disease clings more tenaciously. Consequently, it is worth while to employ in those all the powerful and sharp remedies and not to spare the afflicted members. And, indeed, he can promise himself better results in all respects who at its very beginning has been able to recognize the disease silently creeping through the viscera: for where, long fostered, it has increased its powers by long feeding and now the evil has established itself within, alas, by how much labor is freedo mto be hoped for! Therefore, bending every energy, apply yourself to combat the small beginnings and treasure in your mind and memory these precepts.

In the first place, I advise you not to accustom yourself to every

climate—avoid where the wind is from the south, or from a mire and is heavy with the sweat of a filthy swamp. I prefer the open plain, the wide fields—the airs and gentle zephyrs delight in sunny hills, and the air driven in from the north. Here be there for you—so I order —no rest, no ease—make no delay, tireless keep wild boars on the move with continuous hunting, with continuous hunting stir up the bears: nor let it be a toil to you, overcoming in ycur course the difficulties of the lofty mountain, to turn the speedy stag into the valleys and to encircle the elevated glades with the long hunting net.

I have often seen a sick man who has cured everything by sweats and had left the disease behind in the lofty forests.[12]

But do not think it disgraceful to put hand to the plow and to trace the long furrow with the curving plowshare, or to break the soil and hard sods with the mattock and to destroy the lofty oak with the axe and to dig up from its lowest roots the high mountain ash.[13]

You can exercise even at home—come, pitch for me the little ball in the morning, pitch in the evening—and you can procure sweat in dance, in the strenuous palaestra.[14]

Conquer the evil, be not deceived as to what will follow perpetual desire of inactive ease and bed.

Trust you not in the bed, trust you not in sleep, for by these is the evil nourished: it is deceptive under the image of placid peace and draws nourishment from sweet quiet.

Then, too, in the meantime, avoid all that will sadden the mind—order cares away and trembling fear, vengeful anger and every mind addicted to the pursuits of Minerva.[15]

But let songs delight you, and the dances of youths—boys and girls.[16] Be careful, however, about Venus, before everything avoid concubitus, nothing is more harmful: the beauteous Venus herself loathes it and tender girls detest contagion.[17]

What is to follow? The greatest care is to be taken as to food—in nothing are you to be more prudent and observant.

In the first place, I remove far away all fish whether fed by rivers or swamps or limpid lakes. There are, indeed, some the use of which when necessary it is possible to concede more freely: in all these, the flesh is white, not hard and tough, they struggle amidst rocks and the adverse wave of rivers and sea—such as phycides[18] swim in the sea and rutilæ through the waves, auratæ, gobii and percæ, lovers of the rocks—such as the scarus which at the mouth of the rivers ruminates alone amid the herbs consumed.

Nor would I recommend birds which love to feed in swamps or in mighty rivers or to seek food in the liquid waves. For you, the fat duck, the too crude goose is forbidden and rather let it watchful

save the Capitol[19]: the quail sluggish with burdensome fat is forbidden too. Shun you soft milk, shun you the abdominal viscera of the fat pig—bah! shun the back of the pig and eat not of wild boar hams, however many wild boars you slay in the hunt.

Let not the raw cucumber or truffles take you captive—nor satisfy hunger with artichoke or salaious onions.

Nor am I pleased with the love of milk or the use of vinegar, nor the foaming cup sparkling with pure wine such as the Cyrnean hills and the Falernian fields and Pucinean land send out, or such as the Rhetic grape with small raceme gives from our hills—rather be content with the Sabine and those which the thinner earth brings forth and the Naiads temper with much water.[20]

And if food from the garden, the food of the gods, be to your mind and simple vegetables and unpurchased pleasure, let not the green mints be absent, not the pleasant sisymbria and the intyba and sonchus flowering through all the winter: and let sium ever delighting in river waters, and sweet thymbra and odoriferous calamint and joyous meliphylla and bugloss be plucked from an irrigated garden and wild erucula in whole handfuls and olus and rumex and the seeds of the salty crithmus.

The very bushes will bear lupus—gather thence the first asparagus gather thence asparagus of the vine, before it has unfolded its branches and has not as yet, woven its shade and commanded its clusters to hang green.[21]

But it were too long and it is not necessary to go through them one by one—and now I am called to another duty. I am now to lead the Muses from Aonian shades into new groves of Nature.[22] So if they are unwilling to weave for my brow a chaplet of laurel and to bind my head with such a crown, at least may they think it just that my temples may be crowned with an oaken wreath for service to so many thousands of men.[23]

If anyone take the disease in early spring, or, indeed, in the autumn, if his health is good and he has plenty of blood, it will be advantageous to bleed by the basilic or the median vein[24] of the arm and to draw out the polluted blood. Moreover, at whatever season this plague seizes you, have no hesitation in drawing out the corrupted blood and foul contagion as well as in dispelling the infection *ab alvo*—but first prepare what is to be driven out, dissolve concretion, attenuate the crass and break the tenacious.

Therefore, take care to make a decoction of Cretan thyme and Pamphylian thyme which is like to thymbra but harder, the twining grass of the hop, and fennel and smallage and the seeds of the bitter fumitory—to these is to be added filicula imitating the rough whorls or polypi and adianthus refusing to be touched by water; join to these,

sterile asplenum and painted phyllitis. When you have previously for many days drunk a decoction of these and have concocted every crude humor, then physic with acrid squill and bitter colocynth and heavy hellebore and also that which springing up on the shore where plays the wave of the sea, thrice changing color, thrice changing its flowers in a day denotes the fact by its name, an herb with potent root, to which add ginger, wild cucumber, Nabathaean incense, myrrh, bdellium and liquor ammoniaci, lachryma panacea (opopanax) and colchicum with sweet bulb.[25]

This done, if perchance your heart be cold and your spirits depressed and it will not please you to try severe measures at once and extinguish the plague in a short time but to act by gentle means and use the milder remedies for a longer time—then it is open to you to turn the mind to the remaining nutriment and to the tenuous seeds of the hidden disease. This, indeed, is wont to creep in in marvellous ways—accordingly, certain exsiccants will be useful and certain resins wont to resist putrefaction. Such are myrrh tears, such are the incenses, cedrus, aspalathus, immortal cypress and cyperus scented as the sweet smelling calamus—nor should be absent the cassias, nor should be absent amomum or macer or agalochus or the odorous cinnamons. Then there in the meadows and near the swamps is scordion which is wont to be so effective against poisons of every kind and contagion—it will cost but little trouble to seek this plant, it grows imitating in its foliage the chamaedrys, in flower, red and with odor alliaceous. Infuse it, verdant branch and roots, at early morn and drink it in long draughts.[26]

But neither art thou, O citrus,[27] to be passed over in silence, thou pride of the Hesperides, thou glory of Median woods—if, perchance though sung by sacred poets, thou wilt not here disdain the medical muse. So to thee be the foliage ever green, ever thick, ever redolent with new flowers—be thou ever laden with fruit hanging golden amid the green foliage. So where the effort is to be made to oppose thee to the blind seeds of disease may the Cytherean tree be toward, admirable in strength—this Cytherea herself as she wept over Adonis, gifted with many a gift and increased by virtues.[28]

There is another discovery of someone—a glass vase hollow within with oblong neck and swelling belly—make a decoction of ivy leaves or handfuls of dictamnus sent from Mt. Ida or Illyrian iris or the dark root of the rhamnus or inula plants[29]; the vapor is carried up above and tenuous fills all the vacant space, and when it has run down, the glass being chilled by the air, it is collected and is condensed a liquid into dew and runs down through the open canals in vagrant streams. They order to drink a cup of this distilled water at the earliest rays of

the sun and then to bring out sweat by bed coverings. Certainly this treatment is not amiss—the force of the infusion is useful to disperse in thin air all the tenuous remains of the disease.

In the meantime, if malign pain tortures the convulsed limbs, hasten to alleviate the pain by oesypum and oil of mastich. To these you may add the hard fat of the goose, an emulsion of linseed, narcissus, inula, and liquid honey, Cretan crocus and the lees of olives. Also, if a vile herpes erodes the fauces and mouth, touch with nitre and water medicated with verdigris, burn the evil seeds and stay the creeping plague. You can, indeed, destroy the achores themselves by no other means than caustics to which you should add some fat which carries in with it the siccants. These same remedies have power if ever ulcers are devouring the suffering limbs, to eradicate them and also to dissolve concreted callus.

If, however, you seem to have tried these without effect or your powers and mind are equal to strong remedies, or you wish not to delay but to hasten to commit yourself to severe treatment and to destroy the dire plague in a short time, I shall now tell of the other discoveries which are by so much the more severe as they are effective the more speedily to terminate the works and miseries of this evil.

And in fact this savage disease, persistent in the highest degree and kept alive by many a fomes, never yet has allowed itself to be conquered by mild and gentle remedies and it resists taming even by the severe.

There are those who in the first place heap together styrax and cinnabar and minium and stimmi and powdered frankincense with the severe fumigation of which they reach the body and take away the wretched disease and dire contagion. And, in truth, this treatment is partly harsh and severe and partly fallacious, too—in it, the spirit is tortured in the fauces and scarcely with a struggle retains the suffering life. For this reason, in my judgment no one should venture to use it on the whole body. It may perhaps be useful for certain members which foul papulæ and Chironian[30] ulcers are eating away.

In most cases they are all better cured by quick-silver—and marvellous is the power inherent in it: either that it is born to receive cold and heat in an instant for which reason it quickly draws our heat into itself and as it is condensed it dissolves the humors and operates more actively just as a glowing flame heats iron more fiercely[31] or since it consists in a wonderful condition, its sharp particles loosed from their nexus and bones carried as far as possible inward colliquate the concreted substances and burn out the seeds of the plague[32]: or the Fates and Nature have given it some other power.

Digressing,[33] I shall now tell whose discovery was this medicine by the gift of the gods—for who could pass over these admirable gifts of the gods?

It chanced that in a deep valley of Syria amid glaucous groves of the umbrageous willow where Callirhoë ran down singing in gentle flood, as the story goes, a cultivator of the garden sacred to the country gods, a cultivator of the glades, a hunter of wild game, Ilceus, stricken with so dire a disease while he watered the soft cyperus and cassia and the wood of fragrant amomum, prayed to the gods thus and saying such words as the following:

"Ye gods, whom I have worshipped long and, thou, sacred Callirhoë, the best of all who art wont to drive away sad diseases, thou in whose honor I, conquering, recently bearing the spreading horns of a deer fixed the horid head on a lofty oak—ye gods, if you will grant me unhappy to take away this plague which afflicts me, night and day, I myself will gather for you the white firstlings of spring, the violets, I will gather for you white lilies and early roses and early hyacinths and I will load your altars with odorous wreaths." The grass lay verdant near—thus he prayed and, as though wearied by the heat, he sank down in the green herbage of the grass. Then the goddess Callirhoë who was bathing in the neighboring fount gliding from the mossy cave through the slippery rocks sent forth Lethean[34] sleep in soft whisper to the gentle youth and spread it amid the grassy shore and among the dark willow-grove: and she appeared to him rising from the sacred fountain beside him in dreams, speaking thus with hallowed voice:

"Ilceus, hearken to the gods in the extremity of thy affliction. It is a care to me that no salvation is to be hoped for for thee above the mighty earth or wherever the sun looks on—this punishment Trivia[35] gives to thee and Apollo at the prayer of Trivia, on account of the deer struck by the dart near the stream and the horrid heads affixed by thee to our trees; for after she saw the wild thing lying dead on the grass, its head cut off and the fields sprinkled with sacred blood, she filled the whole wood with her lamentations and uttered a fearful curse against the perpetrator. Apollo assisted his sister, so acting, to send a shameful plague on thee, unhappy man—both are unrelenting—and he forbade all remedy wherever the sun can see. Consequently, far below the ground, under blind night, the cure must be sought if any there be. There is a cavern covered by trees, one to be regarded with reverent fear, under a rock near here where the wood of Jupiter[36] grows thickest and cedar foliage gives forth a raucous murmur. There, when Aurora first shows herself from the waves, prepare to go; and, suppliant, sacrifice a black lamb in the very entrance and say: 'Thou

mightiest Ops[37] 'tis to thee I make this offering. Then honor black Night and the silent shades and the gods of the shades, the unknown deities and the Nymphs by incense of thus[38] and of the dark cypress. The goddess will not be absent from thee pressing thy cause and calling for aid: she will lead thee into the sacred penetralia of dark earth and carefully supply aid to thee. Arise, to work: nor look upon this as an empty dream. I am she who fertilizes the fields with my vagrant fount, the goddess known to thee from the flood near by."[39] So she spake, and hid herself with speed in the blue stream.

And he, as sweet sleep passed away, joyfully accepted the omen and paid reverence to the friendly Nymph with prayers. "O, I follow, wheresoever, O Callirhoë, thou most beauteous goddess of the nearby fountain, thou callest." Then when first on the coming morn, Aurora rising showed her face, he sought the monster cave pointed out to him, in the wood of Jove under the lofty rocks; in the entrance he stopped his sheep, a black victim and sacrificed her trembling to mighty Ops and said "To thee, most mighty Ops, I make this sacrifice": then he prayed to Night and the goddesses of Night and the unknown gods. He was still burning thuya[40] and dark cypress when a voice rolling out from the caverns of the earth, heard from afar, struck the sacred ears of the Nymphs to whose care are committed the metals hidden in the earth. At once all were in commotion; and they laid aside what they had begun. They happened at the time to be occupied with sulphur fluids and the floods of live silver, striving then to produce gold by their union. Compressing and concocting these in the cold fountain, a hundred rays of compact fire, a hundred of burned air, two hundred of the concreted germs of land, of sea, they had mixed together: seeds which escape human ken. But Lipare, Lipare into whose care it was given to purify by fire the seeds of silver and of gold and sacred bitumen, came to Ilceus through the hidden byways of the dark earth and heartening him, she thus began: "Ilceus, for neither thy name, nor thy disease, nor why thou art come, is unknown to me—drive now from thy heart all fear. Not in vain has dearest Callirhoë sent thee hither—thy salvation is to be produced in deepest earth—take courage and follow me through the silent darkness of the ground. I myself will be with thee and I will lead thee, a goddess present." So she spake; and, stepping in advance, she entered the cave: he followed marvelling at the mighty openings in the earth, the squalid caverns, vast, without light, in their primeval place and the rushing streams under the ground. Then said Lipare: "All this which exposes itself to view is the greatest world: this whole region without light, the places hidden by night, the gods inhabit. Prosperina[41] holds the lowest regions: the upper, the streams

which issuing from their sacred caverns flow through the wide lands resounding into the sea. Between, the rich Nymphs, who produce the various kinds of metal, copper and silver and shining gold—one of whom, one of the sisters, am I come now commiserating thee—I, myself, not ignorant of thy Callirhoë, send fuming sulphur through the yawning crevices of the ground." So they went along covered with earth and darkness.

And now were to be heard flames crackling with sulphur and enclosed fires and brass hissing in the furnaces. Said the Virgin: "This wide region is the land where are the embryos of the various metals—of which so great a desire exercises you who look out on the upper air of heaven. These regions, we, a thousand goddesses, inhabit living in blind caverns, we have a thousand duties, a thousand arts. It is the task of some to lead down the streams, of others to seek the sparks and seeds of flames and coruscating fire scattered through the whole earth. Others mix the material and compress the mass into moulds with great sprinkling of icy water. Not far away the Cyclopes of Aetna have their dwelling with fuming furnaces[42] and turn and smelt at Vulcan's shrieked command and force the sounding brass—this path to the left leads to them by a concealed way, but that to the right leads thee to a flood, a flood flowing with silver and living metal, from which salvation is to be hoped for."

And now they were entering the golden roofs, the houses bespread with spodii[43] and caverns overspread with black soot and glaucous sulphur: and far undulating lakes flowing with liquid silver stood near and bounding their banks. "Here," continued Lipare, "is found for thee respite from such troubles: after thou art washed three times in the living flood, the sacred wave will free thee of all evil." Thus she spake, and at once she washed him three times in the health-giving fountain, three times with virgin hands she threw the waters over his limbs, three times she laved the youth's whole body, he marvelling at the foul exuviæ and limbs freed from malignant disease and the plague left under the stream.

"Go now and when first the purer air of heaven shall receive thee and thou shalt see the shining day and the sun, prepare a sacrifice as a suppliant, worship the chaste Diana and the indigenous gods and the deity of the friendly fountain." So spake the Virgin; and, led from the night into the upper regions the youth expressing his gratitude for so great a gift—she sent him away in speed and he returned to his chosen light.

The new story gained credence, throughout every people this assured medicament gave aid. At first they mixed lard of swine with the

quicksilver: later were joined Orician terebinth and the resin of the lofty larch. There are some who exhibit horse-fat and bear-fat and liquor of bdellium and of cedras: some add drops of myrrh and male thus and ruddy minium and live sulphur[44]. In fact, it will not displease me if it should please anyone to add ground melampodia and dry iris and galbanum and ill-smelling laser and the wholesome oil of lentiscus and the oil of sulphur which has not experienced fire.[45]

So with these anoint and cover the whole body—do not think it filthy or vile—by such means the disease is taken away and nothing can be viler than that. Spare, however, the head and the susceptible precordia. Then bind on bandages and weave fleeces of tow and lay on bedclothes in many a covering—then sweat, let the foul streams flow from the body. It will be sufficient for you to repeat for twice five days. It will be hard; but whatever the thing demands, must be borne. Pick up courage! Certain cure standing in the very threshold will show its symptoms: you will see the liquified excretions of the disease constantly flow out of the mouth in foul sputum and wonder at the enormous flow of infection falling before your feet.[46] Yet small and foul ulcers will erode the mouth: these wash with milk and a decoction of cytinus and green ligustrum.[47] At no other time would I assent that cups of generous wine should be consumed by you, pure Falernian and Chian and sparkling Rhetic in large glasses.[48]

But now, come, congratulate yourself on near safety: your final treatment is now present and that the most pleasant—wash the body, bathe the limbs and purify the members with stoechas and marjolaine and rosemary and sacred verbena and sweet smelling heraclea.[49]

NOTES

[1] Amphitrite was the wife of Neptune, god of the sea, the daughter of Oceanus and the Nymph Doris—of course, she was goddess of the sea and held the islands in her broad bosom.

[2] Cape Verde Islands, anciently called the Hesperides, i.e., the Western Isles, in the Atlantic Ocean, so called from the Atlas Mountains in Northern Africa. These islands were in modern times discovered by the Venetian Captain, Alvise Cadamosto, in the service of Prince Henry the Navigator in 1456.

[3] Prassum (Prasum, Prason) was not under the South Pole but only in the South part of Africa—to place it in the Antarctic is a poetical licence: it is now Cap des Courants on the Strait of Mozambique.

[4] Raptus or Rhaptus, a river of Abyssinia. There is a Rapti in Nepaul.

[5] Carmania—a southern district of Persia, the land of the Carmani, a people on the Persian Gulf, now Kerman. See Pliny, *Nat. Hist.*, 6, 23, 25.

[6] This is an allusion to the voyages of Vasco de Gama, the Portuguese navigator—Eastern India and beyond, discovered by the Portuguese in 1420; until that time that part of the world had not been visited by Europeans by way of the sea. Cyambe, now Tsiampa, a province of Annam to the south of Cochin China. Macer the bark of an undetermined tree from the East Indies. See the Glossary.

[7] Jacobus Sannazarius (Giacomo Sannazaro) is meant, born in Naples, 1458, died 1530, of Spanish extraction, a poet and scholar, author of the celebrated *De Partu Virginis*: his *Arcadia* and *Elegies* are less known, but are worth reading.

Sebethus was a small stream in Campania, now Maddalona, Madalena or Fornello on which Naples (Parthenope) is built. See Statius, *Silv.*, 1, 9, 263. Vergil, *Aeneid*, 734, has a Nymph, Sebethis.

[8] Leo X. who declared a Crusade against the Infidel Turks which came to naught. He was a Medicis and was christened Johannes. The Reformation began in his Pontificate.

[9] Doris was a Nymph who became the mother of Amphitrite and is often spoken of as goddess of the sea.

[10] Fracastor as we have seen generally called his poetry, "lusus," a game, a play, an amusement.

[11] One of the four humors of the body—sanguis, blood; phlegma, phlegm or rheum; bile, chole, yellow bile; and atra bile, melanchole, black bile.

According to Galen, the melancholic humor or Black Bile had the same connection with the spleen that the Yellow Bile had with the Liver. See the amusing chapter in which he deals without gloves with Aesclepiades and his heretical, "nonsensical," absurd theory that the gall-duct secretes the Yellow Bile. Galen on the Natural Functions, Lib. I., cap. XIII. (Kühn's Ed. by George Helmreich Trübner, Leipzig, 1893, p. 40).

It is a curious fact that while this black bile was wholly natural, the thought was till quite lately never very remote that it was corrupt and dangerous to health. Indeed, the Greek physicians not infrequently spoke of it as diseased; one of our own old writers says that it "is sumwhat stynking & is clepid melancoli."

[12] Certainly an error in the case of Syphilis: but at that time, the differentiating symptoms were not certainly known. An exceedingly valuable treatise written a little before the recent advance in Syphilography is Diday's *Histoire Naturelle de la Syphilis*, Paris, 1863.

[13] The "ornus," French "orne," a Continental wild ash—our Mountain Ash is not an ash, it is the Rowan, *Pyrus Aucuparia*.

[14] Boxing, wrestling, etc. Lucet has an obvious misprint, "la lute" for "la lutte."

[15] Goddess of learning, literature, etc.—the meaning is to avoid hard study, rather supererogatory advice to one suffering from syphilis!

[16] Some writers advised against female society altogether as aphrodisiac. Fracastorius advised youthful society of both sexes as tending to draw away the mind of the patient from his disease.

[17] In his prose work, *ante*, as we have seen, Fracastorius considers venery as injurious to the patient himself—here he seems to be considering possible contagion.

[18] Phycides: the Phycis according to Pliny, *Nat. Hist.*, 9, 26, 42, is a fish which lives among sea weed and changes its color with the seasons—it is conjectured to be the Lamprey. There are, however, two European and one American species of ganoid fishes called generically Phycis—the squirrel-hake being one.

Rutilae were Red Mullet or Golden Mullet. Rutilae Auratae were Gilt Bream, Golden Mullet, in French, Dorades (not the Doradoes). Gobii were Gudgeons or Gobies, Gobio (Gobius) fluviatilis, a small European river fish much used for bait. Percae were Perch, generally the fresh water Perca fluviatilis.

Scarus, a well-known sea fish, a kind of wrasse: it feeds on marine grasses and Algae and was formerly thought to be a ruminant. Its liver had deobstruant qualities and was good for the jaundice, yellow or black—and even now, its flesh is tender and appetising—*crede experto*. It is now generally ranked among the *Sparisoma*.

[19] The story about the geese saving the Capitol of Rome is too well-known to require repetition. The "crude" flesh of the goose was hard to "concoct" or digest.

Of quail, Fracastorius had two kinds, the Coturnix as here and the Quaternix.

The French translators seem to have misunderstood vv. 133, 134.

> Tu teneros lactes, tu pandae abdomina porcae,
> Porcae heu! terga fuge . . . . . .

Literally—

> Flee thou the tender milks, thou, the abdominal parts of the curved pig.
> Ah! flee thou the backs of the pig

They omit "teneros lactes" altogether and warn only against eating any part of a pig. See the prohibition against milk later in the Text, v. 138.

[20] The "Cyrnei colles" were the hills of Corsica, Cyrnos: the "campi Falerni" were the well-known Falernian vineyards at the foot of the Massicus: the "Pucinus ager" was in Pucinum, a town in Illyria, now Proseck or Prosecho: the "Rhetica uva" came from the country of the Grisons, the Tyrolese, the Bavarians, and produced not a bad Rhine wine: Sabine wine came from the States of the Church. The Naiads were the rain-producing Nymphs.

[21] Sisymbrium probably Sisymbrium aquaticum, watercress.
Intybus, Endive or Succory—Intubus Cichorium, Linn.
Sium: French, "la Berle," Water Parsnip, (but of several kinds).
Thymbra: Summer Savory.

Calamintha: Calaminth or Basil Thyme.
Meliphyllum or Melisphyllum: Balm-gentle, balm, balm-mint, garden-balm.
Buglossus: Bugloss, Prickly Ox-tongue.
Erucula: probably a Colewort or Rocket, in French, Roquette.
Olus: Spinach.
Rumex: Sorrel.
Crithmus: Samphire or Marine Fennel.
Lupus: Lupulus humulus, Hops.

Asparagus is the green shoots—although the word in Latin sometimes, indeed generally, meant our asparagus, it was also used for a sprout or green shoot—e.g., Pliny, *Nat Hist.*, 21, 15, 54, speaking of the *herbae spinosae*, says: "In totum spina est asparagus, scorpio . . . ."

In *Nat Hist.*, 23, 1, 17, speaking of the Bryony he says: "That (vine) is black which properly is called Bryonia: some call it Chironia, others gynaecantha or aproma, (like the first except the color); we shall speak of the black kind. Diocles prefers its asparagus to true asparagus in food, as a diuretic and for reducing the spleen."

Dioscorides, I may add, has the same view. *Dios.*, 4, 185.

[22] Aonia, Boeotia, from Aon, son of Poseidon, its eponymous hero: the Boeotians were in antiquity noted for illiteracy and stupidity.

[23] A wreath of laurel or ivy was a victor's crown in the arts, poetry, music, etc., but the garland of oak leaves was bestowed for a good deed toward the State, usually for saving the life of a citizen in battle—the *quercus civilis*.

Vergil, *Aeneid*, vi., vv., 771, 2.

"Qui juvenes! quantas ostentant, adspice, vires
Atque umbrata gerunt civili tempora quercu."

These youths, see, what powers they display and bear temples shaded with the civic oak.

Compare Tibullus, III., 6, 2.

"Semper sic hedera tempora vincta geras."

Thus thou always bearest temples bound with ivy.

Or Ovid, *Remedia Amoris*, 75.

"Te precor, O vates, assit tua laurea nobis."

Thee, I beseech, O poet, may thy laurel be with us.

Fracastorius, saving many lives, thought he deserved the garland of oak leaves.

[24] The extraordinary vogue of bleeding was based upon the theory that foul or corrupt matter had got in, the "humors" of the body had become corrupted and the body must get rid of the corruption in some way. That was the theory of salivation and of "issues" and "setons," which were supposed to act as drains to drain off impurities. I am not sure that there are not still some who think boils are of advantage in that direction. I know that within the latter half of the 19th century, it was taught—as I was taught—in at least one great London Hospital, that a "boil is worth £5."

Apparently, although Fracastorius had not got rid of the venesection idea, he had already found out that it was well to save the blood of syphilitics. At

all events he advised bleeding in reality only in the plethoric. It may be observed that Vigo in his *Practica in Arte Chirurgica Copiosa*, lib. v., (1518), advised bleeding if the age and strength of the patient justify it and especially in a plethoric subject, the bleeding to be by the Vena Communis (ulnar) or Vena Basilica of the right arm—so he says of scarifications: "These will be especially useful where the patient is of plethoric complexion, charged with foul humors or covered by eruptions."

[25] Thymbra—Satureia hortensis: Summer Savory.

Filicula: a kind of Fern, Polypody—we have a kindred species Polypodium vulgare.

Adianthus: a kind of Fern whose leaves shed water.

Asplenium: a kind of Fern whose seeds are hard to find and so it was dubbed "sterile."

The strange plant which changes its color, etc., is the Tripolium or Aster maritimus—it was supposed to be white in the morning, purple at noon and red at night.

Pliny, *Nat. Hist.*, 26, 22, says that it grows on the rocks by the sea, "neither in sea nor in dry land," "it is given to hepatics in meal"; and the annotator says: "Vidimus in horto Regio Tripolium dicitur quasi ter canescens." We have seen in the Royal garden what is called tripolium—as it were, aging three times. Adding, "Ter in die floris colorem mutat," it changes the color of the flower three times a day. Some appear to call it "Turbis."

Phyllitis may be the Phyllanthes. Pliny, *Nat. Hist.*, 21, 16, 59, speaks of it and an annotator Gaza translates, Frondiflora. The French translators make it "la langue de cerf" which is Hart's Tongue Fern, Scolopendrium vulgare.

[26] In v. 199 occurs a solecism which recurs in v. 428 and in Lib. III., v. 41. *Resinosa* has the penult and antepenult short, whereas they should be long.
Cedrus is cedar resin.
Aspalathus: a resinous wood with agreeable odor.
Calamus: here Gallingal, or perhaps Andropogon Schoenanthum.
Amomum: Cardamom.
Macer: a kind of bark from the East.
Agalochus: Aloe wood.
Scordion or Scordium: Water Germander.
Chamaedrys: Wall Germander.

[27] Citrus: here the Lemon or citron.

[28] Cytherea: the goddess Venus.

[29] Dictamnus: Dittany.
Iris: here the foreign varieties.
Rhamnus: Buckthorn.
Inula or Enula: Elecampane.
Oesypus: an ointment made from wool-grease.

[30] Storax or Styrax: a Gum Resin.
Minium: Native Cinnabar, Vermillion.

Stimmi or Stibium (Stybium): Antimony Sulphite or crude Antimony.

Thus: Olibanum or Frankincense.

Chironean (from Chiron the Centaur who taught Aesculapius medicine) means in medical Latin, chronic. It contains a pun—*cheiron* is the Greek for "worse" and the implication is that the ulcers are getting worse. The treatment here recommended by Fracastorius remained the last word and the most approved method until our own times.

[31] The idea is that the mercury having a natural affinity for heat absorbs immediately the natural heat of the body and thus becoming glowing hot it melts the foul and crass humors and thus renders it possible to evacuate them or cauterizes and so destroys them.

[32] The particles of quicksilver are supposed to form a wonderful tissue, "compago": they are sharp and loosely held together, and so pierce, penetrate and separate the concreted masses of corrupt humor and burn out the impure leaven of disease.

Very wisely Fracastorius left open the question whether there was not a third cause—there were all sorts of theories on the subject, many of them fantastic.

[33] This myth manufactured by Fracastorius himself is an imitation of that of Aristaeus in Vergil, *Georgica*, Lib. iv., vv. 315-558.

Aristaeus, the father of bee culture, loses his bees by disease; he cries upon his mother Cyrene sitting in her underground chamber "ad extremi sacrum caput . . . . . amnis," she hears him, takes him to her chamber and puts him in the way of recovering his loss. The story is probably from the Greek, but there can be no certainty as to its origin. See Conington's P. Vergili Maronis Opera, London, 1881, Vol. I., pp. 338, 378-407 and notes.

[34] A sleep such as would come from the waters of Lethe. Vergil, *Georgica*, Lib. i., v. 78, has the very expression, "urunt Lethaeo perfusa papavera somno"—they burn the poppies saturated with Lethean sleep.

[35] Trivia, the goddess of the places where three roads meet, was Hecate, that is, Diana, goddess of the hunt, protector of wild deer, etc., and sister of Apollo, who was also the Sun (sometimes).

[36] The trees of Jupiter were oaks.

[37] Ops—the goddess of plenty, riches and power, wife of Saturn and patroness of agriculture—synonymous with Terra, the Earth.

[38] "Thus" or "Tus"; Frankincense, Olibanum.

[39] Callirrhoë means "a beautiful stream." The name was applied to several women and to several fountains—of the latter, perhaps the best known was that in Athens, south-east of the Acropolis and conducted into the city by nine pipes or channels, Enneacrunos—but a warm medicinal fountain of that name in Palestine about two hours west of Lake Asphaltites is mentioned in Pliny, *Nat. Hist.*,

5, 16, 15: "Eodem latere est calidus fons medicae salubritatis Callirrhoë, aquarum gloriam ipso nomine praeferens"—on the same side is the warm fountain Callirrhoë of medical properties indicating the beauty of its waters by the name itself. Josephus: *Antiquities of the Jews,* xvii., 8, also mentions this fountain, but at a somewhat different place and near Jerusalem.

[40] Proserpina or Persephone, wife of Pluto, who on the plain of Enna "gathering flowers, herself a fairer flower, by gloomy Dis was gathered"—Queen of the Nether World.

[41] Certain of the Cyclopes were with Vulcan, firing up under Aetna.

[42] Spodium was a kind of metallic soot which adhered to the chimneys and covered the roofs of furnaces, chiefly those of zinc ores—it was often called Tuttia, tutty, tuttie, etc. In other places, Spodium means slag or dross.

[43] Bdellium: a resinous gum from the Balsamodendron Africanum.
Thus. See note (30) *ante.*
Minium. See note (30) *ante.*
Live sulphur is a native sulphur.

[44] Melampodia: Black Hellebore.
Laser: probably here Assafoetida.
Lentiscus: the Mastich tree.
"Oleum haud experti sulphuris ignem"—oil of native sulphur, impure "oil of vitriol."

[45] See note (24) *ante.*

[46] Cytinus is properly the calyx of the Pomegranate blossom. The word is found only once in Classical Latin (Pliny: *Nat. Hist.,* 23, 6, 59) the word is Greek—here it means Pomegranate.
Ligustrum: probably Privet.

[47] Falernian wine is Italian, Chian wine from the Island Chios and Greek, while Rhetic is Rhine wine.

[48] Stoechas: French or True Lavender.
Heraclea: Opopanax.

Objectives and Standards of Ventilation

By C. E. A. Winslow,[1] New Haven, Conn.

IT IS a great pleasure to attend this annual meeting and to discuss with you the fundamental physiological standards which underlie the work of the ventilating engineer. Physiologists, physicians and engineers alike, are all engaged in one common task, the promotion of the health and well-being of mankind; and success can only be attained by the closest and most cordial mutual understanding as to the objectives which must be kept in view. The physiologists and the physicians are students of the human body, its reactions and its needs. It is for them to determine the conditions of the atmosphere which are most desirable for human health and comfort. The engineer is a master of the physical universe and it is for him to devise and maintain the mechanical apparatus capable of producing the conditions which the biologist finds to be most salutary.

The progress of the art of the ventilating engineer since John Shaw Billings first published his classic work on ventilation in 1884 has been a phenomenal one. With ever increasing assurance of success the engineer has designed fans and heaters and humidifiers and ducts and automatic regulating apparatus capable of maintaining those atmospheric conditions which were deemed to be desirable. This task has been accomplished without difficulty; but meanwhile conceptions of the nature of this task have changed and the time has now come for a radical revision of ventilation practice in the light of accumulated modern knowledge.

The science of ventilation, as it has been understood by the engineering profession from the time of Billings and Woodbridge almost to the present day, has been based on the conceptions of the German hygienist, von Pettenkofer, who in 1862 first clearly enunciated the view that the evil effects of the air of a badly ventilated room were due to alleged organic poisons excreted into the atmosphere from the human body, and that the object of ventilation was the removal of these poisons by dilution with fresh air. Even 60 years ago it was recognized by this pioneer in the science of hygiene that changes in oxygen and carbon dioxide content, such as occur in the worst ventilated room under ordinary conditions, had no physiological significance. Only when oxygen content falls

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to 16-18 per cent and carbon dioxide content rises to 1-2 per cent are harmful effects produced; and these limits are never reached in any ordinary occupied room on the earth's surface. The conception that organic poisons cause the harmful effects of bad ventilation seemed, on the other hand, in the light of the knowledge of 50 years ago an entirely reasonable one and was naturally and inevitably accepted by the medical and the engineering world alike. To Pettenkofer, carbonic acid was of significance as an indirect measure of the presence of morbific matter and it is to him that we owe the assumption that air containing less than a certain amount of carbon dioxide is therefore good, and that air containing more than a specified amount is therefore bad. From this basic assumption it was easy to pass to a computation of per capita air supply and the standard of 30 cu. ft. per person per minute, or 2000 cu. ft. per person per hour is, as can be easily seen, a simple arithmetical statement of the amount of fresh air containing 3 parts of carbon dioxide per 10,000 which it is necessary to introduce, in order to prevent the concentration of carbon dioxide in an occupied space from rising above 6 parts per 10,000.

When the AMERICAN SOCIETY of HEATING AND VENTILATING ENGINEERS was organized in 1895 this concept of ventilation was universally accepted and it was natural and proper that the Society should lend its influence to the embodiment of the air dilution standard in the form of concrete legislation throughout the states of the Union. The movement has met with remarkable success, so that on the first of January 1925, there were 24 states with laws or regulations specifying more or less definite standards of school ventilation based on the Pettenkofer theory. In 9 states, the standard was written into the statute law, in 7 it was a regulation of the state educational authorities, in 5 of the state health department and in 3 of other official bodies. It is true that these laws or regulations often apply only to certain classes of communities or types of buildings, yet as Prof. J. R. McLure has shown, in his valuable monograph on the ventilation of school buildings,[2] the general result has been to impose positive fan ventilation capable of furnishing an air supply of 30 cu. ft. per minute upon a very large proportion of the schools of the United States. Out of the 700 school buildings constructed between 1918 and 1925 in the large cities of the country, 73 per cent were equipped with systems of this type.

Science, however, is a progressive, not a static, thing, and while the Pettenkofer theory was in the process of crystallization in the form of restrictive legislation the whole basis on which it was founded had been undermined by the researches of more modern physiologists. There are five different changes in the atmosphere produced alike by human occu-

[2] Teachers College, Columbia University. Contributions to Education No. 157, New York, 1924.

pancy and by processes of combustion, a decrease in oxygen and an increase in carbon dioxide, in partially oxidized organic compounds in temperature and in humidity. The first two of these changes were known to be practically insignificant as factors in ordinary ventilation by Pettenkofer. As the third change, the production of organic substances associated with the body odor was found to be also of minor importance, attention was finally focused on the last two changes, the increase in temperature and humidity. As far back as 1883, Hermans of Amsterdam arrived at the conclusion that the harmful effects of bad air were due, not to its chemical, but to its physical properties; and in 1905 Flügge and his associates at Breslau definitely and clearly formulated the modern concept of ventilation, a concept expressed by Prof. F. S. Lee in the succinct formula that the problem is essentially physical, not chemical, cutaneous, not respiratory. It is universally recognized to-day that the harmful effects of bad ventilation (aside from the presence of industrial poisons and industrial dusts) are no more the result of hypothetical morbific matter than of changes in concentration of oxygen and carbon dioxide. They are due to the effects exerted upon the heat regulating mechanism of the body by high atmospheric temperature, abnormal humidity and lack of air movement.

The conclusions of Flügge have been amply and universally confirmed by Hill and Haldane in England and by Benedict and the New York State Commission on Ventilation in the United States.[3] In one form or another these various investigators have shown that a group of subjects enclosed in an experimental chamber and suffering from the familiar effects of bad ventilation can in no way be relieved by permitting them to breathe fresh outside air admitted through a tube but can be completely relieved by cooling the vitiated air of the chamber in which they are imprisoned. Morbific matter has gone the way of the miasms of Hippocrates and the only effects which can be traced to chemical vitiation are slight interference with appetite and inclination to physical work due to the psychic effect of body odors. These latter, however, only appear with concentrations of some 20 parts of carbon dioxide equivalent to an air change of 5 cu. ft. per person per minute, and are entirely subsidiary to the thermal influences which constitute the major problem of ventilation. In the Breslau work it was found that subjects exposed to concentrations of 1.0 to 1.5 per cent carbon dioxide (100 to 150 parts per 10,000), with all the accompanying *morbific matter* were perfectly happy and showed no obvious physiological symptoms and no decrease in efficiency, so long as the experiment chamber was kept cool.

[3] For full details of the New York studies and for a review of earlier work see Ventilation: Report of the New York State Commission on Ventilation, E. P. Dutton Co., New York, 1923; and Fresh Air Ventilation, by C. E. A. Winslow, E. P. Dutton and Co., New York, 1926.

On the other hand all of this work has tended to emphasize the very serious effects of even slight degrees of overheating upon the physiological state of the human body. The average individual produces by his vital oxidations from 100 to 400 calories of heat per hour, depending upon the extent of physical exertion. This heat must be given off to the surrounding air at a rate which would normally vary very widely with the temperature of the atmosphere. Yet, by one of the most complex regulative mechanisms of the human body, these processes are so beautifully balanced that the actual body temperature does not vary in health more than a degree on either side of the normal (98.6 deg. fahr.).

At low temperatures this regulation is in part, but only in small part, accomplished by an increase in heat production; at high atmospheric temperatures there is no such adaptation, the heat production within the body being actually increased beyond a certain point, as your Pittsburgh studies have shown. It is, then, the rate of heat loss which varies and which is the chief factor in maintaining the body temperature at a fixed level. In a hot room, the tiny blood vessels of the skin expand (the face becomes flushed) and bring a large amount of blood to the surface of the body to be cooled. When passing into cold outside air, the skin blood vessels contract, the blood is sent into the inner organs and the cooling effect of the air upon it is thus correspondingly reduced.[4] This is the chief regulatory process which operates at atmospheric temperatures below 50 deg. As the temperature of the air rises, a new factor comes in, the increased production of sweat, which is evaporated (if the air be not too humid) with the absorption of heat which always accompanies the change of a liquid to the gaseous form.

The primary effect of high atmospheric temperature is, then, to dilate the tiny blood vessels of the skin and to concentrate the blood flow in them at the expense of the inner parts of the body. In part, the feeling of discomfort and lassitude experienced is probably due directly to anemia of the brain and other internal organs consequent on this cooling of the blood in the capillaries. Furthermore, habitual exposure to such conditions leads to a lowered tone of the whole heat-regulating mechanism and an inability to respond to the demands which may be put on it, and in this way exerts a profound and important influence upon susceptibility to respiratory infections.

With only slightly excessive atmospheric temperature, the body temperature of the subject rises, the heart rate and the respiration increase, and the Crampton index, a measure of the efficiency of the vaso-motor system, falls to a significant degree. The performance of

[4] After long exposure to cold a secondary reaction occurs which produces a dilatation of the skin blood vessels in the exposed parts (the rosy cheeks of a person who has been out in nipping air). This serves as a protection of the part in question against freezing.

physical work is markedly affected. In our New York studies, 28 per cent less was accomplished at 86 deg. as compared with 68 deg. even under conditions of maximum effort, and in a test where the subjects were stimulated to work only by a small bonus, a temperature of 75 deg. showed 15 per cent less work performed than was accomplished at 68 deg., a conclusion of the most far-reaching importance as an argument for the regulation of temperatures in the workshop and the factory. Finally, the work of Hill in England and the New York State Commission in this country has indicated profound effects of only slight degrees of overheating upon the prevalence of respiratory disease, a problem to which reference will be made in a subsequent paragraph.

During the past four years our knowledge of this subject has been extraordinarily enriched by the admirable series of studies carried out by your Society in co-operation with the United States Bureau of Mines and the United States Public Health Service at Pittsburgh. It is impossible to say too much in praise of the exhaustive and careful physiological studies made at the Research Laboratory by McConnell, Houghten, Yagloglou and others.

The result of all this has been, as has been said, to give a completely new conception of the ideals and objectives of ventilation from the physiological standpoint, a conception which necessitates a corresponding change in methods to be recommended by the ventilating engineer for the promotion of human health and comfort. Aside from those industrial conditions which lead to the production of harmful fumes and dusts, the whole problem of chemical composition of air may be dismissed from consideration and in the ordinary schoolroom or office, the presence of dust particles and of bacteria is equally insignificant. I cannot refrain from pointing out that the Synthetic Air Chart which has been advocated by members of your Society for estimating the healthfulness of a given atmosphere is somewhat misleading in its failure to distinguish between what is important and what is unimportant. Variations in carbon dioxide and air supply and bacteria (within the limits reached in practice in the schoolroom and the ordinary workroom) have little or no significance from a biological standpoint and the number of dust particles present in the air may be equally unimportant or may be profoundly significant, depending on the particular type of dust concerned. The one problem of universal and supreme importance is the problem of temperature, and anything which tends to obscure and mask this factor can only mislead both the engineer and the physiologist. Good air, so far as the schoolroom is concerned, is air which has a temperature of 66-68 deg. with a moderate relative humidity and a moderate, but not excessive degree of air move-

ment. If these conditions are realized in practice, the air of the schoolroom in an overwhelming majority of instances can be pronounced to be good. If they are not realized, the carbon dioxide content, dust and bacteria are of little practical moment.

If these conclusions are sound, and so far as I am aware they are now accepted by every physiologist and physician who has made a study of the subject, it is obvious that standards of ventilation based on the Pettenkofer theory of dilution must be fundamentally revised. Ventilation in the modern sense is conceived primarily as a procedure for removing the excess heat produced by the human body and replacing it by fresh air that is cool but not too cold. The amount of air needed for this purpose will obviously bear no necessary and direct relation to the number of persons in a given confined space unless we also take into account the opportunity for direct heat loss through walls and ceiling. Under certain conditions, as for example in an interior auditorium with no appreciable heat loss, the standard of 30 cu. ft. per minute will prove substantially correct. An average adult gives off, as a result of oxidations within the body, approximately 400 B.t.u. of heat per hour and this is almost exactly the amount of heat necessary to raise the temperature of 30 cu. ft. of air from 60 to 70 deg. In factory workrooms where there are special heat sources such as forges, furnaces, and annealing ovens, the amount of air necessary to maintain good ventilation may be materially more than this. I have in mind a particular annealing shop where 30 changes of air per hour were effected with notably successful results. On the other hand where the room is relatively small and has one or more outside walls the necessary air change may be materially less. It is this condition which obtains in the ordinary schoolroom and it is in connection with school ventilation that a radical revision of our earlier viewpoints is most clearly indicated.

When the New York State Commission on Ventilation began its work ten years ago the major problem before it was obviously to determine whether the then accepted system of plenum fan ventilation was better adapted than any other to the maintenance of good air conditions in the school. The Commission began its work with no prepossessions in favor of any type of ventilating equipment. Personally, I was somewhat inclined to believe that the plenum system had been needlessly criticized and rather expected that our study might lead to its vindication. We quickly discarded as ineffective the attempt to ventilate the school by the use of windows alone and concentrated our attention upon two procedures which preliminary work indicated to be most promising. The first of these was the ordinary plenum system and the second was a modified gravity system of ventilation involving the admission of cool air over slanting window boards with tempering radiators below the windows, and the removal of warm air from above by

gravity exhaust ducts. It is of interest to note that the latter proccedure is no radical innovation, but is essentially the method used by Tredgold and Reid in England and in this country some 75 to 100 years ago. The conditions necessary for the success of the window-gravity method of ventilation are outlined by the New York State Commission as follows:

(*a*) Radiators must be located beneath the windows and extend for the full width of the windows from which the air supply is to be derived. These radiators, because much larger than those customarily installed in ordinary plenum systems, should be either automatically controlled by intermediate acting thermostats or equipped with fractional or modulating hand-controlled valves, placed at the top of the supply end of the radiator. Even when automatic control is included it is best to supplement it by the provision of hand control as well; and standard metal radiator shields are desirable to protect the pupils nearest the radiators from excessive heat. It is to be noted that the use of intermediate acting thermostats or modulating hand-controlled valves presupposes the use of a vapor vacuum steam heating system.

(*b*) Deflecting boards of some satisfactory type should be placed at the bottom of the windows. Devices which include small box-like openings, and devices which involve the use of filtering screens of various types are undesirable. A plane glass deflector one foot high is fairly satisfactory, but the best results may be obtained by the use of curved vane deflectors which secure the most equable distribution of the air. The windows in the use of this method should open from the bottom and not from the top.

(*c*) In order to avoid certain practical difficulties it is recommended that windows should be so constructed as to open easily from the bottom, and that window shades should be firmly attached to the window frame, the best arrangement being that which includes two shades anchored midway between top and bottom, one to be pulled upward and the other downward, the shades being so guided by cords and pulleys as to avoid the shaking of the screens by the incoming air flow.

(*d*) Exhaust ducts having a total area of not less than 8 square feet for an ordinary schoolroom should be provided on the wall opposite the windows. These exhaust openings should be conveniently dampered so that their area may be adjusted to varying weather conditions. The exhaust ducts should be carried up through the interior of the building so as to avoid chilling and the tendency to back drafts should be further reduced by placing an aspirating cowl on the opening at the roof and perhaps by placing heating coils in the exhaust duct.

(*e*) The schoolroom should not be overcrowded. The successful results reported by the New York Committee with this method of ventilation have been obtained with a cubic space allowance of 250 cu. ft. per second grade child (39 children in an ordinary schoolroom) and with a cubic space allowance of 310 cu. ft. per sixth grade child (31 children in an ordinary schoolroom).

(*f*) A large thermometer with 68 deg. fahr. clearly indicated as a danger point should be displayed in a prominent position on the teacher's desk.

In the course of studies extending over a period of over three years, in scores of different school buildings, we came to realize that the ordinary plenum system of school ventilation and this window-

gravity system, as defined above, were both reasonably adequate, according to generally accepted standards, but differed substantially in two respects. In the first place the gravity method had a materially lower air flow (some 10-20 cu. ft. per minute through the exhaust duct) as compared with the plenum method. The carbon dioxide was therefore higher (averaging 6-11 parts per 10,000) but the lessened aeration was still amply sufficient to avoid objectionable odors.[5] In the second place, the gravity method was characterized by a slightly but materially lower temperature. With the plenum system it was necessary to keep the schoolrooms at an average temperature of 68½ deg. in order to protect the children against the chilling effect on the face of a powerful draft of air. With the gravity method the schoolrooms could be kept at an average temperature of 66½ deg.

According to your Research Laboratory studies these two atmospheric conditions, 68½ deg. with a high air flow and 66½ deg. with low air flow, are substantially equivalent in their power of removing heat from the body. As a matter of practical experience, however, it was the unanimous opinion, of teachers and of expert observers alike, that the cool room with the lower air-flow was more agreeable than the warm room with its change of 30 cu. ft. per minute. This phenomenon is explained primarily by the fact that the high temperature necessary to protect the face against rapidly moving air produces an overheating, uncomfortable for the clothed parts of the body; although the slight and stimulating variability of the atmosphere of the gravity-ventilated room no doubt plays a part in the process. In any case the result was clear. The rooms ventilated by the window gravity method were not only quite as satisfactory as those supplied with 30 cu. ft. of air per minute, but were more satisfactory from the standpoint of the comfort of the occupants and as will be seen later they also exerted a highly beneficial effect from the standpoint of the prevention of respiratory disease.

If these results are accepted, as I believe they must be, as demonstrating that a positive system of fan ventilation, supplying 30 cu. ft. of air per minute, is unnecessary in an ordinary schoolroom, we are faced with the fact that existing legislation requiring the installation of such systems is the cause of a large and indefensible waste of public funds. I have estimated, on the assumption that only one-third of the new school construction in the United States is equipped with mechanical ventilation, that over three million dollars a year is needlessly spent in

[5] It should be noted that whle the air flow through the exhaust duct was only 10-20 cubic feet per capita, the total air change, as indicated by carbon dioxide figures must have been 12-30 cubic feet per capita, the additional air change being due of course to leakage. As a rule, however, the window-ventilated rooms had over 7 parts carbon dioxide corresponding to a total air change of less than 25 cubic feet.

the installation of equipment of this type[6] and if the fan systems are operated (which they frequently are not) there is a further waste of money burnt up and poured into the circumambient atmosphere, which amounts for New York State alone to $200,000 a year.

If this were all, if the harm done by outworn theories of ventilation were limited to the pocket book the matter might be dismissed as one to be settled between appropriating bodies and their own consciences. There is a much more serious problem involved, however, as the New York studies have made manifest. The maintenance of a temperature over 68 deg., which is an essential and unavoidable condition of the 30 cu. ft. per minute standard, is not only unnecessary but positively harmful. In our studies we compared in the most exhaustive way, and during two successive winters, the effect on 2,500 to 3,000 children of three types of actual schoolroom ventilation. The first group of children were in rooms ventilated by window inlets and gravity exhaust and kept at a mean temperature of 59 deg. The second group were in rooms ventilated by window inlets and gravity exhaust and kept at a mean temperature of 66½ deg. The third group were in rooms ventilated by fan supply and gravity exhaust and kept at a mean temperature of 68½ deg. When the records for the two years were analyzed and averaged it appeared that the amount of respiratory sickness in the 59 deg. rooms and the 66½ deg. rooms was essentially the same; while the 68½ deg. rooms showed an 18 per cent excess of absence due to respiratory sickness and a 70 per cent excess of respiratory sickness among pupils in attendance. After the most careful study of social and economic conditions and of all other factors bearing on the case, there seemed no escape from the conclusion that even the slight degree of overheating associated with an average temperature of 68½ deg. had exerted a profound and harmful influence on the susceptibility of the children to respiratory disease.

Thanks to the researches of Leonard Hill, confirmed and extended by the New York State Commission, we understand, to some extent at least, the mechanism of the process by which overheated rooms in winter produce such disastrous results. In a warm room, the tissues of the nose and throat are normally swollen and moist and full of blood. When passing to the cold outdoor air these tissues become compact and dry and their blood vessels contract. In persons habitually exposed to a high room temperature, however, this normal adaptive response fails. The blood vessels always contract but the tissues remain swollen and moist, and such a condition furnishes ideal opportunities for the invasion of the germs of respiratory disease.

[6] See *American School Board Journal*, June 1925, LXX, 45.

(*To be continued*)

"The Sanitary Inspection of Rural Schools"*

DR. J. A. MORGAN, *Peterborough.*

I HAVE attended a number of meetings of this association and have heard very little said about the Sanitary Inspection of schools. I consider it a very important part of the rural M.O.H.'s duties, and I think it would be to the interest of many of us to hear the subject discussed, a large majority of us have to do with the rural school of one or two rooms, I therefore give this paper and hope that it will be followed by free discussion. The school is the centre of a section where the children assemble, and it is here where infectious disease often gets its start in a community. Therefore I think it is very important that the M.O.H. keep in close touch with the schools. The teacher generally knows of any sickness in that section and is in a good position to let the M.O.H. know if there is any doubt about its character, and often an epidemic can be stamped out before it gets under way. If at our visits we explain to the children the importance of Isolation in doubtful cases and whenever in doubt to let the teacher know and by enlisting the assistance of the teacher we will often get much valuable information.

Many of these schools were built in the early days when the sole object was to have a school where the boys and girls were to get an education. They had to be built with what was then available, and in most cases sanitation was a secondary consideration. As a result, today we have schools built and so arranged that it is very difficult to establish a proper sanitary arrangement. They are on top of a high hill where it is next to impossible to get a proper water supply, and, if you do, the well is so deep that only the older children can work the pump. Then, again, the grounds may be high at the back with the water closet placed there and the well at the front on much lower grounds.

These are examples of the great variety of difficulties we meet on our visits to the schools, not to mention the condition of the closets, pumps and wells out of repair, uneven and unclean grounds and many other conditions which go to show that "what is everybody's business is nobody's business" and everything is neglected. Sometimes to remedy a complaint the trustees meet and decide on the change (say, dig a new well) and go ahead and do the job without the knowledge of the M.O.H. and after they have finished the new condition is worse than the old.

* Read at the Canadian Health Congress, Toronto, May 6, 1926.

The well may be now more readily polluted than the old one. I also find in taking samples of water for examination that it is hard to get a good report. The school is built just beside the roadway and the well close to the road, which is always a source of contamination. Last year I had 13 samples from as many schools examined and found five good, two poor, and six very poor, one of these marked poor was a well drilled 18 feet into rock with a cement top which sat on the rock. It is hard to make a trustee believe that you could get poor water out of such a well. I was very careful in taking these samples and had them delivered to the laboratory within one or two hours of taking. I would like to hear the experience of others along this line. I saw a statement since beginning this paper that was made by a good authority and which should be food for thought for the people of rural districts—it was that there is a higher percentage of physical defects among rural children than among city children. I believe this to be so, and I think it should be remedied. I think the reason is that city children are inspected and their defects remedied, while the rural child's defects are not discovered until it is too late to remedy them. I have reference to eyesight, ear trouble, bad teeth, deformity tonsils, hernia, defects of speech, chest, etc. It is difficult for obvious reasons in a school with just one room to make an inspection of children that is at all satisfactory. And to make an examination which is not thorough is worse than making none at all, for it places the parents in a sort of false security. The teacher, with a little instruction, might be of great assistance in making an inspection of the children and referring cases of defective teeth, eyesight, tonsils, round shoulders, running ear, running nose, bad hearing, etc., to their family physician.

A short talk on some important health point at each visit is of great value. To people who have always been well, sickness is seldom mentioned to the child, and a reminder to the child that he has a body to care for and the manner in which he cares for it is of great importance to him all through life. This will make him more careful. They are at the age when they take notice of such things, especially when told at school, and the economic value of health pointed out to them brings it more forcibly before their notice.

I think it is in the interest of the Province that a move be made for better schools in the country with more sanitary conditions. The talk of consolidated schools is often mentioned when repairs are asked for and the trustees in some cases are refraining from spending money on their schools for fear of the new plan being adopted. I don't see how it can be worked in districts where the roads are bad in winter.

Taken as a plant where the young spend thirty hours a week the

rural schools are very much below the standard made use of in other lines of life in the same locality. I was much interested one evening in seeing a father call at a school with his car to take his children home. While he was gathering his little ones I was estimating the value of his car and I concluded that it was worth as much as the entire school plant, grounds and all.

There were over thirty children attending the school, and it hardly seemed justice that they should sit in a crowded room all day trying to study and be taken home at four o'clock in the afternoon in a luxurious car.

Radio Talk

Prepared for the Canadian Social Hygiene Council and delivered at C.K.C.L. Broadcasting Studio, Toronto.

Past and Future

By Dr. Gordon Bates,
General Secretary, Canadian Social Hygiene Council.

I AM inclined to feel with Dr. George Vincent, President of the Rockefeller Foundation, that people do not want to be educated. We would much rather be amused, and certainly the process of accepting amusement is a much easier one than that of absorbing education.

These weekly Social Hygiene Radio Talks continuing through the winter months will be educational and, as far as possible, painless. They are not intended to be amusing but in so far as they are calculated to appeal to a fundamental spirit which should exist in all mankind—love for one's fellow man and desire for the preservation of the race, and in as much as the topics to be discussed have to do with the well-being of all of us, you should find them to be not without interest. If the addresses do appeal to you, and if the thousands of C.K.C.L. listeners-in come to believe in the principles of Social Hygiene and come into the movement, as all good citizens should, then we shall have another demonstration of the significant truth that radio is playing a most important part in the development of public opinion.

The term, Social Hygiene, is new. It has only been in general use for a very few years and there are many misconceptions as to its meaning. I am reminded of a story. A certain gentleman had friends in Scotland who made excellent shortbread and a little while ago they sent him a small consignment. It was a little damp when it arrived, so he turned it over to his landlady, who happened to have been born south of the Tweed, with instructions to heat it. As a long time afterwards the shortbread had not turned up the hungry gentleman went to the landlady and said, "Where is my shortbread? Did you not heat it?" "Heat it," answered the landlady. "Heat it? Of course I've heaten it and its hinside me."

The other day a lady said, "Why do you not change the name of the

Social Hygiene Council and the Social Hygiene Club to Hygiene Council and Club? Social Hygiene is concerned with so many nasty things."

This lady was just like the landlady who inadvertently devoured my friend's shortbread. She hasn't got the idea.

The Social Hygiene movement is a great international movement making for health, personal and communal, in its widest sense. Naturally in a movement of this sort, where one is attempting to right conditions that are wrong, one must tell the truth and sometimes the truth is disagreeable. Under its present name the Social Hygiene movement has a brief history. If the human race is to progress it must have a great future.

In a sense the Social Hygiene movement began as soon as man began to believe that it is worthwhile to organize to save human life, as soon as man began to see that the ideal civilization can be achieved as the result of the acquiring of scientific knowledge as to how men should live in communities together.

Social reform in general was a precursor of the Social Hygiene movement. Social reform, generally speaking, being the term applied to organized efforts directed towards making the world a better and happier place to live in by the mitigation of existing evils or by the application of preventive measures. Havelock Ellis, who appears to have first used the term, Social Hygiene, intelligently states that it is a development of the public health movement which began towards the end of the last century, but that it differs from it and from social reform in its ordinary accepted meaning in some important respects.

The discoveries of Pasteur in the seventies resulted in a realization of the fact that a great deal of the illness and deaths which used to be looked upon as a visitation of the Almighty is definitely preventable. This resulted in the development of the vast field of preventive medicine and public health. Communicable diseases have decreased materially in their incidence as a result and death rates have fallen in proportion. Organized attacks have been made on such diseases as typhoid fever, diphtheria, tuberculosis, yellow fever, venereal disease, smallpox and a host of other diseases, and the success of such attacks has been increasingly evident because of the knowledge of specific cures or methods of prevention which science has put in our hands. One result is that at the present time the duration of life for the average child now born in this part of the world is about 57 years. This is at least fifteen years greater than in 1850.

To a large extent the attack on disease has been an attack on bacteria.

In Social Hygiene, however, one recognizes that there are more than bacteria concerned in the prevention of disease and death. As in tuberculosis, long hours of work, overcrowding in slums and inadequate nutrition bear a part, so in all disease the way in which we live has an influence on our happiness and on our length of life. Social Hygiene recognizes the fact that human life is of primary importance in the affairs of the state and that one of the first duties of the true citzen should be to support all measures making for health and long life. These measures should include all efforts directed towards the conditions under which people live. Health and long life will result of themselves in a more stable community and better environment for everybody. We all know, of course, that preventable death is one of the greatest causes of poverty and the lack of money is responsible for a large proportion of the evils of society.

Students of Social Hygiene must be impressed with the fact that in bygone days there was no appreciation of the fact that the world is not only made up of people, but that there are men, women and children, and that the children are the future parents of the race. Marriage and giving in marriage have gone on all through the ages, and misery and even disease and death have resulted only too often.

Only too frequently we find that such problems as are involved in the spread of tuberculosis, feeble-mindedness, venereal disease and divorce, for this latter phenomenon seems to be spreading like a disease, are rendered more serious because marriage is entered into by young people who have no appreciation of the serious responsibilities which they are shouldering. Marriage should be stable and permanent, and marriage should result in the bringing into the world of healthy, happy children who will live out the allotted span of life in their turn as happy and contented citizens. Too frequently such a result does not ensue. And what is the remedy? Surely education of children by their parents in order that they may go through life prepared for pitfalls of whose existence they have no conception.

Unfortunately in spite of the progress which has been made of recent years many people still die long before they should, and, by the way, three score years and ten is probably much less than our reasonable expectation of life in a well-organized state. There is still poverty and the rapidly increasing divorce rate, particularly in the United States, makes one feel that our young people's education has been sadly neglected in the matter of choosing mates.

The Social Hygiene movement offers to humanity a means whereby the sum total of life and happiness may be materially increased by the application of many specific methods. Many of you have heard,

for example, of the movement towards periodic health examination. If incipient disease may result in premature death a means should be devised to detect incipient disease and prevent death. If people will unite in a great international movement for health, physical, mental, moral and social, their efforts will be effective because they are united for a common purpose, and there is no doubt that the movement for periodic health examination will only become a real and effective movement if and when the people demand it in order that their own health and lives may be protected. The Social Hygiene movement provides the opportunity for them to express such a desire.

If parents have in the past not done enough in the direction of the education of their children in order that they may later assume real responsibilities as the healthy parents of future generations then a movement of this kind—a movement in which the importance of clean, healthy parenthood is emphasized—should provide the great opportunity of the race.

May I sum up. In the past unnecessary disease and death have been far too frequent. Organized public health has done much to improve conditions and cut down death rates. We now realize both that social conditions affect health and longevity, and that an unnecessarily high death-rate means wastage of the greatest of our assets—human beings. That it in itself may be responsible for poverty, slums and low moral standards.

Furthermore, we recognize that our greatest achievement must be a race of healthy, happy human beings, and that if this end is to be achieved we must start with the child. The greatest factor in the health and happiness of the child is the home. Therefore every effort must be made to spread education as to the great responsibility which the parent or the prospective parent has in raising the physical, mental and moral ideals of the race.

We ask all citizens to support the Social Hygiene movement as an organized effort for health—health in its broadest sense for ourselves, our children and our children's children.

Sanitary Inspectors' Association of Canada

Light and Health

Presidential Address to the Sanitary Inspectors' Association of Canada, Brantford, Ont., September 1st, 2nd and 3rd, 1926.

ERNEST W. J. HAGUE,
Chief Health Inspector, Winnipeg, Man.

One is glad to note in the Public Health and Medical Journals considerable space devoted to the discussion of the beneficial and curative effects of light, both direct sunlight and artificial sunlight.

In the earliest period of Medical Science we find the old Greek physicians advocating the use of sunlight as a curative agent, but throughout the centuries we have somewhat lost sight of the necessity to man of light. Our cities have grown larger and smokier. Bad construction has given us large numbers of dwellings and work rooms inadequately lighted, where the sunshine rarely or never enters. We live too much indoors and work in sunless offices and shops. Only in summer do we somewhat make up for our lack of sunlight during the winter. During the long winter in our Northern climate we gradually get weakened for lack of the sunlight so necessary to our well being, with the consequence that towards the end of the winter we reap a heavy mortality from influenza, pneumonia, and other diseases due to our weakened resistance.

Some architects and engineers have boldly claimed that natural light in buildings is not essential so long as adequate ventilation is provided, and the result of their efforts is seen in the large number of dark or semi-dark rooms in dwellings, tenements, hotels, and other places. I have even known Health Officers to agree with these contentions.

In coal mines, and in the stoke-holds of ships, a certain number of men must, of necessity, work under artificial light only, but the tendency in recent years in our larger cities, where land values are high, has been to erect buildings with two or even three storeys below ground level, in the rooms of which large numbers of persons are compelled to work without daylight. This example has been followed in smaller towns where land is still cheap. Many architects still fight to be allowed to design and

erect hotels and apartment blocks in which the bathrooms, kitchenettes, etc., are without natural light. There is no necessity for this, as many fine buildings exist in which all such rooms have outside light, but it is easier to design blocks with dark rooms, and probably the plumbing costs a little less. Only the enactment of progressive building and housing laws will prevent the constuction of such undesirable buildings. Personally, I have always deprecated these views as to the non-necessity of natural lighting, and have on many occasions argued the question with engineers and architects. It was not easy, however, to show clearly that harm did result to the occupants of such buildings. One could, however, point out that sunlight is necessary for man, and that the closer we keep to nature the better, as half the ills which now beset the children of men are due to our living in towns and cities under artificial conditions.

There is now, however, evidence that the pendulum is swinging the other way, as recent investigations now point most strongly to the necessity for our receiving a full measure of sunlight if we desire to be healthy. Professor Barton, of Pennsylvania University, recently had this to say about the sun:

> "The importance of the sun to man can scarcely be overstated. Without the sun, life on the earth could not survive a month. The temperature would soon fall to that of the space which surrounds us, which approaches the temperature called absolute zero, which is 459 degrees below zero Fahrenheit. The clothing with which we protect ourselves from cold is from either the animal or vegetable kingdom, neither of which could survive low temperatures. Man might survive a longer time by the use of fuel. He could not use water power, for the water would be ice. Winds would largely cease. He would soon perish also from lack of food.
>
> "But even if that were supplied, the very lack of the sunshine on his body would make him perish of disease, or, perhaps, from the effects on his mind.

Within the last four or five years experiments conducted by many investigators have demonstrated most clearly the necessity to man of an ample quota of sunlight. These investigations are now being followed up keenly by a host of scientists, and we seem to be on the verge of even greater discoveries.

The sun, then, is the source of all our light and heat. Its rays travel in waves sent out at the speed of 186,000 miles per second. Some of these waves are a mile or two in length, whilst the shortest waves measure less than a thousandth-million part of an inch. It is known that

there are 40 octaves of these waves, each with its own length. Only one octave, however, consists of waves which can be seen by the human eye. Visible light rays average about 1/50,000th of an inch in length. Below the light waves visible to the eye there follow some twenty octaves of waves of shorter length. There are, for instance, the infra-red rays, and below these we get the violet and ultra-violet rays. Ultra-violet rays begin at about 1/70,000th of an inch in length. There are smaller rays still, such as the X rays, the Gamma rays, and the Millikan rays. It is the ultra-violet rays, the X rays, and the Gamma rays (which latter are emitted by radio-active substances) which are now being the most talked about and used in curative medicine. The ultra-violet rays in particular are being recognized as necessary for the well-being of man. Unfortunately many obstacles prevent us from receiving the full benefit of these short ultra-violet rays. Clouds, dust, smoke and fog absorb a large portion of them, and they never reach the earth. Even ordinary window glass filters out the most effective portion of the rays. Dr. Leonard Hill reports of measurements taken in England of ultra-violet radiation that smoke pollution robs the big cities of from half to two-thirds of this solar influence, and that we are only beginning to realize some of the penalties we are paying for our tolerance of the perennial smoke cloud that lies so heavily over our cities. Our clothing is also a hindrance to the benefits we might receive from the rays.

Dr. Hill says that the most effective rays come from "diffuse blue sky shine" as well as direct sunlight, indeed, that sky shine may be the greater source.

Seeing that so many things interfere to prevent our receiving the full benefit of the sun's rays, treatment with ultra-violet light rays produced artificially by means of special lamps, such as mercury vapor arc, and Finsen lamps with fused quartz lenses is now becoming very common both in hospitals and in private practice. The lamps are used both for flooding light baths and also for concentrating on various parts of the body.

I mentioned that ordinary window glass largely obstructs the passage of ultra-violet rays. In order to surmount this difficulty, some hospitals are now constructing sun galleries with windows made of quartz glass. This is very expensive, but it is possible that some new, cheaper material will shortly be produced which will replace the ordinary window glass now in use in our houses. Experiments with this object are now nearing success.

Sanatoria are provided at high altitudes above all atmospheric pollution where the patients are gradually accustomed to receiving the sun's rays on their naked bodies. The most celebrated of these is that of Dr.

Rollier, located in the Alps. Some remarkable cures have been effected here, especially in tuberculosis.

One disease in which ultra-violet ray treatment has been greatly successful is Rickets, which is a disease of malnutrition, mostly due to poverty. In children affected with this disease, the wrists and ankles swell, the legs are too weak to support the body and become distorted or bent. Children need foods rich in vitamines, such as milk and cream. A substance much used for the cure of rickets is Cod Liver Oil, which is rich in vitamines. It has been recently discovered that other oils, such as olive oil, cottonseed oil, and other substances which do not ordinarily contain anti-rachitic vitamines can be given these valuable properties by exposing them to ultra-violet rays for as short a time as half an hour. David Masters, in his interesting book, "The Conquest of Disease," states that margarine exposed to ultra-violet rays becomes charged with something essential to health, and actually becomes as nourishing as butter, which normally contains the vitamines stored up in the grass from the sunshine. He continues as follows:

> "One thing is obvious, sunshine is free to all. It costs nothing. But to rob the poor people of sunlight by herding them in the slums, where the sun seldom penetrates, is to starve them to death."

And again:

> "Rickets is a disease of darkness as well as under-feeding. The way to conquer it is plain. Nourish the children on cod liver oil and fresh milk and give them a place in the sun, and rickets may be banished. It means abolishing slums and teaching mothers to feed their children properly, and it will cost a vast sum of money, but gradually, a little at a time, it may be accomplished."

Some interesting experiments have recently been conducted in Wisconsin in the direct irradiation of cows. It is stated that the milk from cows thus treated has more nourishing qualities. This is well illustrated by a case I read of in which two cows, both of the same age and breed, were selected. They were expected to calve about the same time and did so. But one of these cows for some time before and after parturition was exposed daily to ultra-violet rays. The calf born to this cow attained twice the growth in a given time than the calf belonging to the untreated cow.

During the last few years the City of Winnipeg has been endeavouring to stamp out Bovine Tuberculosis in its dairy herds. The cows have

all been tested several times. A part of the agreement made between the city and the Dominion Department of Agriculture requires that the stables in which the dairy cows are kept must be sanitary, including sewer connections, concrete floors, adequate ventilation, and windows equal in area to 1-20th of the floor space. One of the hardest tasks our inspectors had was to make the cow owners see the necessity for adequate light. One old lady addressed the Inspector thus: "Mr. Inspector, what for you want window in my stable, my cow she don't read." The matter of irradiating our animals and our foodstuffs with ultra-violet rays artificially generated has great possibilities.

My particular reason for taking up this subject of "Light and Health" for discussion is to point out that the methods of supplying life-giving violet rays by artificial means has developed largely owing to the fact that the patients requiring such treatment have been defrauded, in some way or other, of the necessary amount of sunshine or sky shine to keep them in proper physical condition. As prevention is better than cure, it follows, that if these mothers and babies could have lived under proper conditions—if they had received good nourishing food and plenty of sunshine, they would not require to receive artificial sunlight.

This brings us to consider some of the principal causes why we do not receive sufficient sunlight. They are largely preventable. The first is the pollution of the atmosphere by smoke. As Sanitary Inspectors, we should do all that we can to enforce the smoke laws, and thus clear the atmosphere of our cities and towns. Our Canadian cities are not nearly so smoky as some large cities in other countries. Large sums are being spent in efforts to abate this nuisance, and thus do away with the pall of smoke which prevents inhabitants from receiving the sunshine so necessary to their health and well-being. Factory smoke is being controlled, because owners have been brought to realize that smoke is unnecessary and means waste. The railway companies are gradually coming into line, although they have been amongst the worst offenders. The chimneys of private houses present a more difficult problem. With the increasing use of soft coal, the amount of smoke in the aggregate from domestic chimneys is enormous. I suppose that in Greater London there must be over one million dwellings. Up till now, smoke from chimneys of dwelling houses has not been classed as a nuisance under the English Public Health Act, but the Ministry of Health are now considering taking some action to attack the problem presented by the smoke from these countless chimneys. Possibly the solution lies in the use of coke or some other smokeless fuel.

The second cause of lack of sunlight is the large number of dark and semi-dark rooms, both in dwellings and workshops. One of the

great difficulties of city life is how to secure and maintain the necessary open spaces round our homes. Modern factories are being so constructed as to have ample light. This is because employers have found that there are fewer accidents, better work done, and less sickness amongst their employees in well-lighted work rooms.

In our dwellings light is even more necessary. Growing children must have light. Every large city has hundreds of buildings containing dark or semi-dark rooms.

I know of one block in Winnipeg, where there are forty rooms without windows opening directly to the outside air. We find tenements with narrow courts containing windows, and the rooms lighted by such windows are often so dark that artificial light has to be used in the daytime. We finds courts cumbered with landings and stairs which overshadow the windows and obstruct light. The basement rooms especially, in many such blocks are not fit for occupation. Land gets more valuable in cities, and the tendency is to use every inch which the law will permit of.

It is necessary for health officials to be on guard all the time to prevent further encroachments, for when property interests and health interests clash, the former often win out.

Now that we have the support of these more recent discoveries as to the value of and necessity for ample sunlight, let us take heart and continue the good fight, until there shall be no more dark rooms in either dwelling or workshop, and the atmosphere of our cities is clear and unobstructed.

One other thing Sanitary Inspectors can do, viz., to spread this gospel of the necessity of sunshine to the human race; to point out that to live in darkness stunts growth and fosters ill-health; to impress on all with whom we come in contact these truths; and to advise such habits of life as will ensure to each of us a daily sun-bath.

To sum up, the objects to be attained are:

1. Clear atmosphere for our cities and towns.
2. The abolition of dark rooms in dwellings and workshops.
3. The invention and use of a window glass which will permit the passage of ultra-violet rays.
4. To inculcate in the minds of the people the necessity for adequate sunlight and to promote such habits of life as will ensure that every person shall receive his daily quota of the life-giving beams.

Monthly Jottings of Sanitary Inspectors' Association

The 13th Annual Convention, held at Brantford, September 1-2-3, was probably the most successful gathering ever held. There was a good attendance, especially of Ontario Inspectors. There were seven from West of the Great Lakes, and all the Ontario Provincial Inspectors, five in number, were present, as well as Dr. McCullough, the Chief Officer of Health for the Province. Hamilton was well represented by four Inspectors, and Dr. Roberts, their Medical Officer of Health, also gave us the encouragement of his presence. Toronto was represented for the first time.

The programme was well received by those present, and good discussion was provoked by the Addresses and Papers. We were specially honored by the presence and addresses of Dr. Amyot, Deputy Minister of Health, and Dr. McCullough. There was much food for thought in the address of the President, E. W. J. Hague, on "Light and Health," as well as other papers by Dr. A. J. Slack, H. McIntyre, Arthur Rigby, Dr. Hutton, Medical Officer of Health, Brantford; Alexander Officer, and W. H. Meadows. Further information on these papers will follow later, and some of them will be published in the Journal.

The Social end was not forgotten, and the Mayor and Council of Brantford, the Medical Officer of Health, and Inspector Glover, did everything possible to make our visit pleasant.

There is evidently a desire on the part of the Inspectors of Ontario to come into our Association, and the Government of Ontario is desirous of having the Inspectors of that Province form a strong branch. We believe that this will be the outcome.

With the idea of fostering this movement, Toronto was selected as the place for the next meeting, although cordial invitations were received from Victoria, Vancouver and Winnipeg.

The reports of the Executive and the various Branches will appear later.

The Officers elected at the Annual Meeting, for the coming year, are:

President—E. W. J. Hague, Winnipeg, re-elected.

Vice-Presidents—Ontario, W. C. Millar, Fort William, re-elected; Manitoba, Jas. Arkle, St. James, re-elected; Saskatchewan, A. Wright, Prince Albert, re-elected; Alberta, J. Butterfield, Edmonton; B.C., L. Robertson, Vancouver, re-elected.

Executive Council—Miss E. Russell, J. Foggie, T. J. Booth and F. C. Austin.

Auditors—H. H. Marshall and A. Barclay.

Secretary-Treasurer—A. Officer, Winnipeg, re-elected.

Saskatchewan Health Official's Association

Presidential Address given by ARTHUR WILSON, M.D., D.P.H.,
M.O.H., City of Saskatoon.
Before the First Annual Convention of the Saskatoon Health Officials' Association at Saskatoon, Sept. 22, 1926.

To the Members of the Saskatchewan Health Officials' Association.

I WISH to express my appreciation for the honor of being the first president of the Saskatchewan Health Officials' Association.

It would appear as if the time had come to organize. In the Eastern Provinces of Canada the medical health officers have their annual gatherings, but as this is a new and, as yet, sparsely settled Province, it would seem that a more enthusiastic and successful meeting could be held by having not only the medical health officers but all persons engaged in public health work invited to attend. In fact, it has been rather difficult to know whom to invite and whom not to invite. If we accepted the definition for health that Williams gives in his book "Personal Hygiene Applied," that is: "Health is the quality of life that renders the individual fit to live most and serve best," I am afraid we should have to go far outside of health departments and organizations. (Incidentally, would this definition not make a suitable slogan for an association such as ours? "Fit to live most and serve best").

Briefly, I shall try to mention a few ways in which this association may be of service to public health:

1. *Health Education.* Dr. Douglas, Medical Health Officer of Winnipeg, has printed on the front of his monthly bulletin a quotation: "No sanitary improvement worth the name will be effective, whatever acts you pass or whatever powers you confer on public officials, unless you create an intelligent interest in the public mind." That statement is true, but, on the other hand, it is also true that one of the best ways to create public interest is to start something by taking a persistent, prominent violator of the law into court. The subject, as well as the medical health officer, gets publicity and is discussed from every angle. It is equally true that an unpopular law, or a law that is not fully understood, cannot be enforced. Health education, however it may be

done, is, after all, the basis of intelligent public health work. Our publicity methods are not always satisfactory and the results are very often discouraging. In spite of the fact that the press is of great assistance and generously donates space that medicine companies would pay a good price for, nevertheless, too often health information is conveyed to the public as a news item with the medical health officer's name appearing frequently in large type or as an item in the joke column, or sometimes as a scare headline. In the Saskatoon Phœnix of August 17th there is a good illustration of a scare headline. "Tainted water sickens many. 75 per cent of the city ill." Our city water supply did not cause one case of illness this year. The bacteria count of the water has been excellent at all times. Such sensational falsehoods are spread all over Western Canada and do a great deal of harm to business. These reports never come directly from the Health Department, but usually are started by the criticism of some report made by the Health Department to the council. Why should municipal health officers' work be made more difficult by this unnecessary publicity any more than the work of those in government service? Might not this Association come to some fair understanding with the press? Is there not a code of ethics for the medical health officer as well as for the physician?

Then, again, health literature is printed and distributed by the Federal, Provincial and Municipal departments of health, as well as unofficial health organizations, such as the Red Cross Society. I question if 5 per cent of it is read by the public and much of it is poorly prepared. There is another kind of free literature with samples of much advertised drugs, which costs the people of Saskatchewan thousands of dollars a month. So, too, one might mention the itinerant health man giving a course of wonderful lectures on health and the great value of raw milk and certain foods, for which he charges a nominal sum of eight to ten dollars for each attendant. These are some of the present methods of health education that I think an Association such as this might very well study and try to improve.

2. *Legislation and Enforcement.* Much of health legislation is open to criticism. I am quite certain that this province has as advanced legislation as anywhere in the Dominion, but, in order to prove its effectiveness, it must stand a test in court where a good lawyer is looking for weaknesses in the working of the section to defend his client. A great deal of health legislation would not stand such a test. I wish to mention, with gratitude, the support and co-operation of the officials of the Provincial Health Department in the campaign that this city is carrying on over compulsory installation of plumbing. They have made it possible for us to get this work done.

It is only as a last resort that a health officer will prosecute. There should be other ways of dealing with these cases. I understand that in some American cities there is a commission appointed composed of the mayor, city solicitor and the health commissioner, who first consider the circumstances of the offender and, as a result, comparatively few persons appear in court. Much of our police court work in the past has been too trivial. Nuisances may be of animal or human origin. The communicable diseases are spread by those of human origin. It is interesting to look over our prosecutions for the past twelve years. Previous to 1920 the majority of prosecutions taken were on nuisances from some animal origin, but since that date there have been fewer and more important cases taken into court; for instance, spitting in public places, defective privies, failing to instal plumbing, failing to provide individual drinking cups, overcrowding, etc. I notice in the annual report of the Provincial Department for 1924 that they report twenty-five convictions, and they might be termed mostly nuisance of animal origin. Protection of milk and water and food supplies might be profitably discussed by this Association.

3. *Organization*. This Association might also very well discuss the organization of boards of health to avoid the interference of petty politics, and the most efficient organization of health departments, rural and urban, because, after all, a well organized board of health and department is of first importance and no good work could be done without it.

This organization might plan health surveys and study carefully their reports. Campaigns such as the Seymour plan against smallpox, diphtheria and typhoid fever for the North American Continent, might be endorsed. One of the first acts of this Association could very well be to go on record as supporting this work most heartily. The best ways of co-operating between municipal, provincial and federal departments of health and the remuneration of health officers might be very carefully considered. It is interesting to note that in the daily paper a few days ago a civil servant received a penalty for misappropriating monies, and the defendant's solicitor offered as an excuse the fact that the man was underpaid, receiving only about $140 or $150 a month. I could mention a good many well qualified persons engaged in public health work who are getting a much smaller salary than this. Is it possible for this organization to make public health work more attractive and, at the same time, more effective.

In the past public health activities have been directed against unsanitary surroundings and the control of mass infection, which undoubtedly has reduced much of the physician's work; for instance, there

is not the smallpox, diphtheria and typhoid fever today that there was fifteen or twenty years ago, and, as a result, this has deprived the physician of considerable practice and revenue. However, it would appear as if in future the personal element in health work will be more prominent, by this we mean, periodical physical examinations and personal hygiene applied. In this work the family physician will come into his own and must play the most important part.

We would ask you in your discussions to be, as far as possible, constructive and brief, but please remember we would like free discussion. This Association is yours to make what you will of it.

News Notes of Saskatchewan Health Officials' Association

The first annual convention of the Saskatchewan Health Officials' Association was held at the University Building, Saskatoon, on Wednesday, September 22nd, 1926.

Some 40 delegates registered from all points of the Province and the officials of the Association are enthusiastic regarding the addresses which were given and the discussions which followed the papers.

The convention was welcomed by G. W. A. Potter, acting Mayor of Saskatoon. He referred to the excellent work which was being done by the president of the Association in his capacity of Medical Health Officer of the City of Saskatoon.

Dr. Arthur Wilson, of Saskatoon, in his presidential address stressed the necessity of the educational factor in public health work and considered that greater co-operation with the press would further the efforts which all health officials were making to educate the public in modern methods of disease prevention.

Representative speakers addressed the convention on suggested activities and policies of the new Association, amongst whom were Dr. M. R. Bow, Regina, for City Medical Health Officers; Mr. Albert Wright, Prince Albert, for Sanitary Officers; Miss Ruby Simpson, Regina, for Public Health Nurses; Dr. W. H. Orme, Saskatoon, for Veterinary Officers; Prof. C. J. McKenzie, Saskatoon, for Public Health Engineers; Dr. R. G. Ferguson, Ft. Qu'Appelle, for Anti. T.B. Officials; Dr. W. S. Lindsay, Saskatoon, for Laboratory Workers.

The meeting was addressed at a noon luncheon by Dr. M. M. Seymour, Deputy Minister of Public Health, who urged the members of the Association to concentrate their efforts during the next few months on the three preventable diseases—diphtheria, smallpox, and typhoid fever. Dr. Seymour considered that there was a great future before the Association, and congratulated the members upon the co-operation which had brought the Association into existence.

At the business meeting held in the afternoon all the officers of the Association were re-elected, and it was decided to have the public health nurses represented on the executive, Miss Ruby Simpson, Director of School Hygiene, being named for this position. Dr. W. H. Orme, veterinary officer for the city of Saskatoon, was also elected as a member of the executive to represent the veterinary officials.

The next meeting of the Association will be held in the City of Regina in 1927.

The Secretary reported that there were already 81 members in the Association, which included medical health officers, public health nurses, public health engineers, sanitary officers, laboratory workers and veterinary officials.

The Hon. J. M. Uhrich, Minister of Public Health, who was unable to be present, communicated his best wishes for the success of the new Association.

The Provincial Board of Health of Ontario

Communicable Diseases Reported for the Province by the Local Boards of Health for August 7, 14, 21, 28, 1926.

COMPARATIVE TABLE

Diseases	1926 Cases	1926 Deaths	1925 Cases	1925 Deaths
Cerebro Spinal Meningitis	6	2	4	1
Chancroid	1	—	1	—
Chicken Pox	136	—	133	—
Diphtheria	158	13	244	10
Encephalitis	—	—	4	2
Gonorrhoea	107	—	112	—
German Measles	24	—	4	—
Measles	320	—	164	—
Mumps	2	—	43	—
Pneumonia	—	67	—	37
Poliomyelitis	5	—	19	—
Scarlet Fever	106	—	141	2
Small Pox	17	—	7	—
Syphilis	48	—	112	—
Tuberculosis	95	79	133	44
Typhoid	43	2	111	5
Whooping Cough	256	8	305	10

The following Municipalities reported cases of Small Pox:—Fort William 1, Peterboro 8, Cavan Tp. 1, Millbrook V. 2, Orillia 1, Belleville 1, North Bay 2, Lindsay 1.

J. W. S. McCULLOUGH.

Editorial

DENTAL HEALTH IN ONTARIO

The institution of a Dental Health Day in Ontario, on October 20th, is evidence not only of the capacity of the capable Director of Dental Services of the Ontario Department of Health, Dr. F. J. Conboy, but also of the growing realization of the great need for better care of the teeth. Once the relationship between teeth and mastication was the prime factor, and, indeed, practically the only factor in forcing us to take better care of our teeth. Now the effect of neglect is known to be not only inadequate treatment of food in the mouth but all the results which may come from focal infection. Proper supervision and care of the teeth may make all the difference between health and protracted illness, and, finally, even between life and death.

Dr. Conboy has been successful in enlisting the support of many and varied organizations in his effort to create widespread interest in his campaign. Life Insurance Companies have distributed pamphlets by thousands. Various clubs and welfare organizations have taken an interest. Public meetings have been organized in various parts of the province. Advertisers and the press have co-operated in a most friendly way, and last, but not least, the dentists of the province have given a full measure of co-operation.

Measures of this type are essential in all fields of health organization if we are ever to achieve success in our efforts towards educating the public to the end that illness and death may be prevented, and unfortunately many health officers take a long time to learn this essential truth. Dr. Conboy has the fine qualities of leadership which fit him for this type of work. He and the Ontario Department of Health are to be congratulated on the success of their effort.

DIPHTHERIA

It will be recalled that, as announced in a previous issue of the *Public Health Journal* some months ago, the State and Provincial Health Officers of North America, of which Dr. M. M. Seymour, Deputy Minister of Health for Saskatchewan, was the last President, a plan for

the periodic stressing of certain diseases at stated intervals during the year was endorsed. The scheme involves the specializing on Diphtheria during September and October, Smallpox during November and December, and Typhoid Fever during January and February. Some of the literature prepared in connection with the plan has now come to hand. The statistics and statements in connection with Diphtheria are significant and are reproduced in full herewith.

"There were 1,441 preventable deaths from Diphtheria reported in Canada, excluding Prince Edward Island, in 1923; and in the same year in 35 of the United States there were 129,461 cases and 10,366 deaths, both preventable.

Approximately 90 per cent. of the deaths from Diphtheria occur in children under ten years of age.

Diphtheria can be cured by the early full use of antitoxin.

Diphtheria can be prevented by the use of toxoid of toxin-antitoxin, which induces a lasting immunity.

The best time to give toxoid to immunize against Diphtheria is during the first year, after the third month; that is when there will be the least reaction, and when protection is most required.

A Schick Test will determine if any individual be susceptible to diphtheria infection, or if immunity has been established; and should be used six months after giving toxoid or toxin-antitoxin.

No harmful results occur from the use of toxoid, toxin-antitoxin or the Schick Test.

In 23 representative American cities, where the death rate since 1918 has fallen an average of 10.3 per cent. per year, the fall has been coincident with the general application of toxin-antitoxin by the health departments.

In New York City the death rate from Diphtheria per 100,000 of population dropped from 18.4 in 1920 to 11.9 in 1924: this reduction coincident with the immunization by toxin-antitoxin of 250,000 children since 1920."

Summing up the statement the above facts stand out. Diphtheria is an exceedingly dangerous and fatal disease. It may be definitely prevented by the use in well children of toxoid. If it occurs in children unprotected by toxoid immunization it can certainly be cured by the use of anti-toxin if the anti-toxin is given early in the disease and in sufficient quantities:

A death from Diphtheria means:

(a) Failure to immunize on the part of parents. (The only excuse for such failure is ignorance of the value of this procedure.

(b) Failure to call the doctor early enough (frequently again ignorance is the reason).

(c) Failure on the part of the doctor to give anti-toxin immediately and in sufficiently large dosage. It is to be hoped that this cause is not a frequent one.

In view of the fact that science has provided a means for its prevention there should be no death or disability from Diphtheria. Where such death or disability occurs somebody is to blame. In so far as organized medicine and health authorities are concerned there is no question as to the duty involved. It is to give adequate and immediate information to the public by all means at our disposal as to how to prevent Diphtheria and how to cure the disease after it has developed. It is the duty of health authorities to disseminate such information constantly. By emphasizing the subject at certain times during the year it is hoped that the public will give greater heed.

There is no question as to the sincerity of motives behind the Seymour plan. Health authorities and, indeed, all public-spirited persons should lend their sympathy to the idea and exert every effort to make it effective. The *Public Health Journal* will gladly give the fullest publicity to the plan and calls on all and sundry of the citizens of Canada at large to help.